

- AA. Styles solitary, entire or 3-parted at apex (4-parted in *B. Steyermarkii*).
- B. Style entire.
- C. Flowers solitary; leaves sessile.
- D. Leaves oblanceolate, 10–14 cm. long, 3–4 cm. wide with 100 or more pairs of veins; peduncle and sepals lightly puberulent...3. *B. longifolia*.
- DD. Leaves rounded or broadly ovate, 2–5 cm. long, 1.5–3 cm. wide with not more than approximately 10 pairs of veins; peduncle and sepals glabrous.
- E. Peduncles minute, ca. 2 mm. long; sepals 8–9 mm. long, 3–4 mm. wide; petals 6.5–8 mm. long, 5–7 mm. wide.....4. *B. tepuiensis*.
- EE. Peduncles ca. 15 mm. long; sepals ca. 25 mm. long, 10 mm. wide; petals 45 mm. long, 30–40 mm. wide.....5. *B. crassa*.
- CC. Flowers in racemes or subracemes; leaves petiolate.
- D. Leaves somewhat oblique, oblong-subelliptic, acute at the apex.....6. *B. holostyla*.
- DD. Leaves symmetrical, oblong-lanceolate, obtuse at the apex.....7. *B. venulosa*.
- BB. Style 3- or 4-parted at the apex.
- C. Style usually 4-parted, occasionally 3-parted, the cells of the ovary varying correspondingly; sepals 10 or 11; corolla a striking yellow.....8. *B. Steyermarkii*.
- CC. Style 3-parted, ovary 3-celled; sepals 3; corolla rose-colored or white tinged with rose.
- D. Peduncles strongly ancipitous.
- E. Pedicel 1–2.5 cm. long; petals 3–3.5 cm. long, 2.5 cm. wide; margin of the leaf lightly denticulate toward the apex. Cuban species.....9. *B. cubensis*.
- EE. Pedicel 0.5 cm. long; petals ca. 2.5 cm. long, 2 cm. wide; the margin of the leaf entire. South American species.....10. *B. stricta*.
- DD. Peduncles terete.
- E. Inflorescence in large, many-flowered open panicles; leaves oblique.....11. *B. paniculata*.
- EE. Inflorescence of solitary flowers or in threes, not paniculate; leaves symmetrical.
- F. Leaves rounded or obtuse at apex, retuse; bracteoles 3 per flower.
- G. Leaves oblong-spathulate, the veins many but forming no conspicuous submarginal veins; petals 2 cm. long, 2 cm. wide at apex.12. *B. Dinizii*.
- GG. Leaves oblong-oblanceolate with conspicuous submarginal veins; petals large, 3–3.5 cm. long, 3 cm. wide at apex....13. *B. sessilis*.
- FF. Leaves linear-lanceolate, very acute at the apex; bracteoles absent.
- G. Pedicel, calyx-lobes and parts of the leaves hirsute; veins of the leaves conspicuous, numerous, ca. 20 per cm.....14. *B. duidae*.
- GG. Pedicel, calyx-lobes and the leaves glabrous; veins of the leaves inconspicuous, 5–7 pairs.....15. *B. lanceifolia*.

1. *Bonnetia tristyla* Gleason in Bull. Torrey Bot. Club 58: 396. 1931.

Tree 8–10 m. high. Branchlets glabrous, angled in dried state, marked with nearly circular leaf-scars, the internodes longer than in most species. Leaves not as crowded at the apex as in most species, coriaceous, glabrous, slightly oblique, oblong-obovate, 7–12 cm. long, 2.5–5 cm. wide, obtuse at the apex, tapering abruptly at the base into a stout, very short petiole ca. 2 mm. long and wide, deep green above, paler green beneath, the margin crenulate with small, spinulose teeth particularly in the upper indentations, the lateral veins elevated on both surfaces, ca. 12 pairs, arcuately

ascending, anastomosing near the margin. Flowers solitary in the upper axils; peduncles glabrous, 6–8 cm. long, exceeding the smaller upper leaves in length, swelling toward the apex; sepals 5, imbricate, glabrous, unequal, the outer two smaller, broadly elliptic, ca. 1 cm. long, obtuse at the apex, the inner three considerably larger, broadly obovate, ca. 2 cm. long, rounded at the apex; petals 5, yellow, flabelliform, 3 cm. long and ca. 3.5 cm. wide at the apex, tapering gradually from the apex to the base; stamens very numerous, the filaments thread-like, ca. 10 mm. long, joined at the base, otherwise free, the anthers oblong, ca. 1.5 mm. long, deeply lobed at the apex; ovary ovoid, 3-celled, glabrous, the styles 3, 9–10 mm. long, swelling considerably and incurved toward the apex. Fruit not seen.

VENEZUELA: Territorio Federal Amazonas: Summit of Cerro Duida, along valley forest between Central Camp and Brocchinia Hills, alt. 1675 m., *J. A. Steyermark* 58108 (Ch), Aug. 31, 1944 (tree 25–30 ft. tall; flowers large, 3–4 inches in diameter, opening in late morning, the petals yellow; leaves deep green above, paler beneath).—Summit of Mt. Duida, hillsides and flat ground at Central Camp, alt. 1600 m., *G. H. H. Tate* 536 (TYPE, NY; US), Dec. 20–28, 1928 (large tree).

When this species was first described it was thought to be the first instance of “free styles” in the genus. *Bonnetia roraimae* Benth. is another example of the same style-formation. However, these two species are so far removed from each other that a comparison is unnecessary.

Steyermark 58108 is a very valuable second collection of this species. This number was collected very close to the type locality and affords added information. The color of the corolla, yellow, is very unusual. This is the first instance of any color other than rose or white appearing in the genus. However, the newly described *B. Steyermarkii* also has yellow petals. Steyermark collected his specimen from a “tree 25–30 feet tall.” Tate refers to his specimen as a large tree, just how large is a matter of conjecture. However, presumably it is considerably larger than 25–30 feet.

Just how strong a character the angled stem may prove to be is hard to decide with only the two specimens for comparison. In the dried state, the stem appears definitely angled. The angled condition is not continuous along the stem but appears to extend from internode to internode. In this it resembles some of the Chinese species of *Eurya*.

The very unequal calyx-lobes furnish another interesting character. The three inner lobes (20 mm.) measure nearly twice as long as the two outer lobes.

2. *Bonnetia roraimae* Oliver in Trans. Linn. Soc. ser. 2, 2: 272, pl. 37B, figs. 9–17. 1887 (ex imThurn in Timehri 5: 190. 1886).—Melchior in Nat. Pflanzenfam. ed. 2, 21: 150. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931; in Brittonia 3: 171. 1939.

Shrub or small tree up to 8 m. high, the trunk as much as 30 cm. diameter. Branches glabrous, verticillate, terete, gray-brown, the branchlets purple-red, the surface often very rough because of the very close succession of leaf-scars. Leaves coriaceous, small, glabrous, congested near the ends of the branchlets in a very close spiral arrangement, oblong-obovate to oblanceolate, 8–13 mm. long, 5–6 mm. wide, broadly acute to obtuse at the apex, tapering at the base into a short petiole less than 1 mm.

long, dark green above, pale yellow- to brown-green beneath, the uppermost leaves tinged with brick or rose, the margin finely denticulate, revolute near the base, the veins obscure on both surfaces. Inflorescence usually a single flower at the apex of the branchlets, rarely two; sepals 5, imbricate, glabrous, subequal, 5–5.5 mm. long, ca. 4 mm. wide, the two outer obtuse at the apex, less rounded than the three inner ones, the margin glandular-denticulate, especially along the edge exposed in the imbricate arrangement; petals 5, pinkish white within, deep rose without, obovate, 6–8 mm. long, 4–5 mm. wide, retuse at the apex, tapering toward the base; stamens very numerous, in series, the filaments glabrous, thread-like, varying in length, the longest 3 mm. long, the shortest filaments on the exterior row, joined only at the extreme base, otherwise free, the anthers obcordate, ca. 0.5 mm. long, 0.5 mm. wide at the apex; ovary ovoid, glabrous, 3-celled, 3 mm. long, 2 mm. diameter, multi-ovulate; styles 3 or 3-parted to the base, glabrous, the stigmas three. Fruit unknown.

BRITISH GUIANA: Mt. Roraima, summit, *G. H. H. Tate* 369 (NY), Nov. 24, 1927.—Roraima, *E. Ule* 8708 (fragment, Ch).

VENEZUELA: State of Bolivar: Summit of Mt. Roraima, 'on northwest portion north and northwest of Summit Camp, in depressions of morros, alt. 2620–2740 m., *J. A. Steyermark* 58828 (Ch), Sept. 27, 1944 (common shrub 4–8 ft. tall, the stem purple-red; leaves coriaceous, deep green above, brownish green beneath, the uppermost tinged beneath with rose or lavender; petals pinkish white within, deep rose without).—Ptari-tepuí, *Bonnetia roraimae* forest on southwest-facing shoulder, alt. 2000–2200 m., *J. A. Steyermark* 59728 (Ch), Nov. 2, 1944 (shrub to small tree, 4–25 ft. tall, the trunks up to 1 ft. diameter; leaves coriaceous, dark green above, pale green beneath, the uppermost leaves tinged with brick or rose; petals rose-pink with white).—Ptari-tepuí, *Brocchinia-Stegolepis-Heliamphora* swamp on southwest-facing shoulder, alt. 2300 m., *J. A. Steyermark* 59791 (Ch), Nov. 2, 1944 (depressed shrub 3 ft. tall).—Summit of Carrao-tepuí, alt. 2470–2500 m., *J. A. Steyermark* 60886, Dec. 7, 1944 (shrub or tree 3–25 ft. tall; leaves dark green above, pale green beneath; petals pink to rose).—Sororopan-tepuí, crest of cerro between east and west end, along streamlet, alt. 2256 m., *J. A. Steyermark* 60144 (Ch), Nov. 14, 1944 (shrub 15–20 ft. tall).—Mt. Auyan-tepuí, alt. 2200 m., *G. H. H. Tate* 1153 (NY, US), Dec. 1937–Jan. 1938.—Mt. Roraima summit, alt. 8700 ft., *A. S. Pinkus* 111 (Ch, G, NY, US), Jan. 9, 1939 (shrub 5 ft. high; corolla red; anthers yellow).

Bonnetia roraimae is probably the most distinctive species of the genus and most easily identified. Like so many species confined to Mt. Roraima and the adjacent similarly isolated regions, it presents characteristics very different from other members of the genus. Most noticeable is the comparative smallness of all parts of the plant. The leaves are the smallest found in the genus, measuring up to only 13 mm. long and 6 mm. wide. One specimen, *Steyermark* 60144, has leaves which exceed these measurements (2 cm. \times 0.9 cm.), but these are still very small for the genus. The close spiral arrangement of the leaves, the minute denticulations along the margin, and the absence of visible veins are also excellent characters of distinction. The anthers are distinctly obcordate, a feature which differs from all other previously described anthers.

When Oliver first described the species he referred to the many stamens as being arranged in five "phalanges." The stamens were illustrated just so, with the filaments joined at the base for one-half the distance of the shortest stamens. This same character has been used in various keys by

later botanists to distinguish the species. The stamens, when first observed in a dissection of a bud, appear to occur in clumps or groups. However, close examination fails to show this arrangement. They appear more likely to be arranged in series, the shortest stamens comprising the outer series. The filaments are free to the base. Two open flowers and one bud were examined.

The corolla and calyx are correspondingly small. The margins of the calyx-lobes are glandular-denticulate, especially along the edge exposed in the imbricate arrangement. This character, very common in other genera of this family, is quite rare in *Bonnetia*.

The styles may be classified as 3-parted to the base or as 3 distinct styles. This character is found also in Gleason's species, *B. tristyla*.

3. *Bonnetia longifolia* Gleason in Bull. Torrey Bot. Club 58: 396, 397. 1931.

Large tree. Branchlets leafless except at the apex, terete, glabrous, reddish brown, the cortex smooth, birch-like, sparsely marked with very wide but short leaf-scars. Leaves crowded at the end of the branchlets, coriaceous, glabrous, oblanceolate, somewhat oblique, 10–14 cm. long, 3–4 cm. wide, broadly acute to obtuse at the apex, retuse, tapering from the middle to the base, sessile, the margin entire, many pairs of veins (over 100) elevated on both surfaces, ascending at an angle of 60° , running parallel and straight to the margin without anastomosing until they join in a single close rather inconspicuous submarginal vein. Flowers terminal or axillary ?, at or near the ends of the branchlets; peduncle stout, 2 cm. long, finely puberulent; sepals 5, coriaceous, lightly puberulent on the exterior surface, broadly elliptical, ca. 2 cm. long and 1 cm. wide, rounded at the apex, the margin membranaceous; petals 5, flabelliform, pink, ca. 4 cm. long, about as wide near the apex, tapering to the base; stamens very numerous, the filaments filiform, ca. 10 mm. long, joined at the base, otherwise free, the anthers linear, 5–6 mm. long, ca. 0.5 mm. wide; ovary ovoid, 8 mm. long, 3-celled; style straight and slender, 10 mm. long, entire, the stigma obscurely 3-lobed. Fruit not seen.

VENEZUELA: Summit of Mt. Duida, hillsides and flat ground at Central Camp, alt. 1600 m., *G. H. H. Tate* 537 (TYPE, NY; US), Dec. 20–26, 1928 (large trees; flowers large, pink, the anthers waxy-yellow).

Only a single collection of this species, the type, has been available for this study. Because the flowers are both very few and large, I have made no dissections, but have depended upon the description of Gleason for the parts not easily discernible.

The branchlets are very distinctive, appearing as though they might have been succulent in the fresh state. On the specimen the cortex, which is very smooth and birch-like, seems to have been separated from the inner layers of the stem in drying.

The long leaves are marked by straight parallel veins, more numerous than in most species. These veins rise from the midrib at an angle of 60° and run parallel almost to the very margin without joining in any manner. At the margin they form a single submarginal vein running the length of the leaf very close to the margin itself.

Gleason described the flowers as "3 or 4, terminal." None of the flowers

are attached at present to the stem. Since there is no evidence of any type of inflorescence, it may be possible that the flowers are axillary near the apex. The fine puberulence of the peduncle and sepals is a most unusual character for the genus, appearing also only in *B. duidae* Kobuski & Steyermark.

4. *Bonnetia tepuiensis* Kobuski & Steyermark, sp. nov.

Arbor parva 8–12 m. alta (vel frutex ca. 1 m. altus); trunco 20 cm. diam., cortice griseo-brunneo, sulcato, ramulis verticillatis vel affinibus, teretibus, glabris, griseis. Folia coriacea, ad apicem ramulorum conferta, patenti-adscendentia, sessilia, glabra, late ovata, 2–2.8 cm. longa, 1.5–1.8 cm. lata, apice obtusa, retusa, basi rotundata, margine minute denticulata, revoluta, costa supra plana subtus elevata, venis ca. 5–6 paribus, undique inconspicuis. Flores axillares solitarii; pedunculis teretibus, glabris, minutis, ca. 2 mm. longis et in diam.; sepalis 5, imbricatis, glabris, lanceolatis, 8–9 mm. longis, 3–4 mm. latis, apice acuminatis ad basim latissimis, margine scariosis; petalis (immaturis) 5, late obovatis, roseo-albis, 6.5–8 mm. longis, apice 5–7 mm. latis, ad basim attenuatis; staminibus numerosis; filamentis filiformibus, liberis basi exceptis, ca. 3 mm. longis; antheris oblongis, ca. 1 mm. longis; ovario ovoideo, glabro, 4 mm. longo, 2.5 mm. diam., 3-loculari, multi-ovulato; stylo integro, glabro, 3-sulcato, 1.5 mm. longo. Fructus non visus.

VENEZUELA: Bolívar: Lower southeastern slope of Carrao-tepuí, in woods, alt. 1675–1980 m., *J. A. Steyermark* 60871 (TYPE, Ch), Dec. 5–6, 1944 (tree 20–35 ft., the trunk branched, up to 8 inches diameter, the bark dark gray-brown, furrowed; leaves coriaceous, spreading-ascending, deep green above, dull green beneath, with purple-red or wine-red margin; petals white, tinged with pink at the tips or along the margins).—Summit of Carrao-tepuí, in open places or surrounding open places with *B. roraimae*, alt. 2500 m., *J. A. Steyermark* 60902 (Ch), Dec. 7, 1944 (shrub or bush, 3–4 ft.).

This species is most closely related to *B. roraimae* Oliver. Both species have universally small leaves and flowers. In both species the leaves have a tendency, although concentrated at the apices of the branchlets, to terminate the branchlet in a dense rosette. The flowers are nestled, solitary, in this rosette of leaves. The general arrangement of leaves does, however, in both species extend farther down the branchlets than in most other species of the genus.

There are notable differences between the two species. In *B. roraimae* the leaves are the smallest to be found in the genus, measuring only ca. 1 cm. long and about half as wide. The sepals are smaller and more or less rounded with glandular-denticulate margins. The stamens are of varying length with obcordate anthers. The style is 3-parted to the base. In *B. tepuiensis* the leaves are nearly three times as long and rounded at their apices. The sepals are lanceolate rather than rounded and the margins are entire; the anthers are oblong and the style is entire.

According to Steyermark, these two species grow in the same locality on Carrao-tepuí.

5. *Bonnetia crassa* Gleason in Bull. Torrey Bot. Club 58: 395, 397. 1931; in Brittonia 3: 170. 1939.

Shrub or tree. Branchlets glabrous, naked except for a few leaves at

the summit, stout, densely marked by leaf-scars, the internodes very short. Leaves coriaceous, sessile, in spirals at the apex of the branchlets, glabrous, obovate, 4–5 cm. long, 2–3 cm. wide, rounded at both apex and base, shining deep rich green above, dull green beneath, the margin entire, ciliate when very young, the veins conspicuous on the upper surface, ca. 10–12 pairs, rising from the midrib at a 45° angle and arching gracefully upward toward the margin joining only near the apex. Flowers solitary; peduncle stout, ca. 1.5 cm. long, glabrous; sepals 5, imbricate, glabrous, oblong, ca. 2.5 cm. long, 1 cm. wide, acute and cuspidate at the apex, the margin entire, scabrous; petals 5, broadly flabelliform, rose to white tinged with pink, 4.5 cm. long, 3–4 cm. wide at the apex, lightly retuse; stamens very numerous, the filaments filiform, joined at the base, otherwise free, ca. 1.5 cm. long, the anthers minute 0.1 cm. long; ovary narrowly ovoid, ca. 7 mm. long, ridged, 3-celled, gradually tapering into a stout, erect, entire style, the stigma 3-lobed. Fruit not seen.

VENEZUELA: Territorio Federal Amazonas: Summit of Mt. Duida, hillsides and flat ground at Central Camp, alt. 1600 m., *G. H. H. Tate* 539 (TYPE, NY; US), Dec. 20–28, 1928 (large tree with pinkish white flowers).—Same locality, slope of Ridge 25, alt. 1800–2000 m., *G. H. H. Tate* 413 (NY), Nov. 26–Dec. 16, 1928 (leaves in whorls of 3; flowers pink with curled petals).—Same locality, Brocchinia Hills, alt. 1700–1800 m., *J. A. Steyermark* 58182 (Ch), Sept. 1, 1944 (shrub 15–25 ft. tall; leaves coriaceous, at tips of branches, deep rich green above, dull green beneath; petals deep rose to white tinged with pink).

This species is most closely related to *B. sessilis* Benth. However, it can be separated from *B. sessilis* by the entire style, the longer, acuminate sepals and larger petals.

Besides the two original specimens studied by Gleason, I had at my disposal an excellently preserved specimen from the type-locality collected by Steyermark. This added material, in beautiful condition, agreed in all respects with Gleason's original well-composed description.

There is considerable variation in the stature of this species. Tate records it as a large tree while Steyermark lists it as a shrub "15–25 ft. tall."

6. *Bonnetia holostyla* Huber in Bot. Mus. Goeldi 7: 301. 1913.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 150. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931.

Small tree. Branchlets glabrous, terete, reddish purple. Leaves somewhat oblique, oblong-subelliptic, glabrous, 6–12 cm. long, 3–4 cm. wide, broadly acute and emarginate at the apex, cuneate at the base, the margin entire, the veins lightly raised on both surfaces, many pairs, rising at an acute angle from the midrib running parallel nearly to the margin then ascending, the petiole ca. 3 mm. long. Inflorescence subracemose, the lower peduncles glabrous, 1–1.5 cm. long, usually 2- or 3-flowered, the upper peduncles usually single-flowered, the pedicels short, ca. 4 mm. long; sepals 5, imbricate, glabrous, ca. 1 cm. long, subrotund at the apex, scarious at the margin; petals 5, flabelliform, emarginate, rose-colored, 15–17 mm. long, ca. 10 mm. wide, widest at the apex, tapering toward the base; stamens very numerous, the filaments thread-like, free, ca. 10 mm. long; ovary conical, tapering in a long style, 14 mm. long, entire its whole length, the stigma broadly 3-lobed.

COLOMBIA: "Hab. in cacumine montis Cupaty ad fl. Yapurá-Caquetá," A. Ducke 12315 (ISOTYPE US; photo Ch, G), Nov. 27, 1912.

This rare species appears to have been collected only once. Fortunately, we were able to examine an isotype deposited in the U. S. National Herbarium. The specimen is rather poor, having been collected with immature fruit. However, the style is clearly entire with a 3-lobed stigma showing no tendency to split.

Another interesting character, not mentioned by the author, is the oblique leaf. This characteristic is not as pronounced as in *B. paniculata* Spruce but is quite obvious, and I am of the opinion that it is with this species that its closest affiliation lies, rather than with *B. sessilis* Benthham as suggested by the author.

7. *Bonnetia venulosa* Martius & Zuccarini, Nov. Gen. Sp. 1: 115. 1826.—Sprengel, Syst. Veg. Cur. Post 4(2): 207. 1827.—G. Don, Gen. Syst. 1: 570. 1831.—Walpers, Repert. Bot. Syst. 1: 373. 1842.—Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 159 (Mém. Ternstr. 71). 1855.—Wawra in Martius, Fl. Bras. 12(1): 325. 1886.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 150. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931.

Kiesera venulosa (Mart. & Zucc.) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Haemocharis venulosa (Mart. & Zucc.) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Small tree. Leaves oblong-lanceolate, 7–8 cm. long, ca. 5 cm. wide, obtuse, attenuate at the base into a petiole 6 mm. long, entire, glabrous, the midrib prominent beneath, the veins close, parallel. Flowers terminal, disposed in a composite raceme; calyx-lobes subequal, glabrous, ovate to suborbicular, obtuse at the apex; corolla unknown; stamens very numerous, the filaments irregularly connate at the base, free above, filiform, glabrous, persistent. Capsule conical, the calyx and filaments persistent, attenuated into the style, 3-celled, 3-valved, the valves ovoid, acute, subwoody on the external surface, glabrous, showing dissepiments with thin inturned margins, dehiscing introrsely from the apex, nevertheless joined inter se with the persistent style; the central receptaculum 3-angled, pushing into the locules and placentae with prominent thick angles, connate with the margins of the valves; seeds linear, minute, with crisp membranous brown wings at both the apex and the base.

NO SPECIMENS EXAMINED.

Since no specimens of this species have been available for this study it has been necessary to rely upon the original description of Martius & Zuccarini, a translation of which is given above. Wawra in his work for Martius' Flora Brasiliensis did not see the type-specimen, or any specimen for that matter. This seems puzzling considering the fact that the species was described by Martius and Zuccarini.

It may be that the specimen had been placed in another genus before Wawra worked on the family. The description seems to apply well to *Bonnetia*. However, no description of the corolla was made by Martius and Zuccarini. It is possible that it may belong to *Mahurea* of the Guttiferae, but this is merely an assumption on my part. Until it can be shown with certainty that it belongs elsewhere, I feel that I should accept it, as have other workers before me.

8. *Bonnetia Steyermarkii* Kobuski, sp. nov.

Frutex 5–8 m. altus; ramulis glabris, griseo-brunneis. Folia coriacea, glabra, elliptica vel elliptico-ovata, sessilia vel subsessilia, 7–9 cm. longa, 3–4 cm. lata, supra atro-viridia, subtus luteo-viridia vel rosea, apice obtusa vel subrotundata, basi rotundata, margine minute denticulata juventute ciliata, costa glabra basi expansa, supra plana, subtus elevata, nervis ca. 12 paribus, undique elevatis, arcuato-adscentibus margine anastomosantibus. Flores apice ramulorum, axillares, solitarii; pedunculis crassis, ancipitibus, glabris, 3–5 cm. longis, ad 5 mm. latis, apice accrescentibus, alatis, alis 1 mm. latis; sepalis imbricatis, ca. 11, subaequalibus, glabris, ovato-lanceolatis, apice apiculatis, ca. 1.7 cm. longis, 0.6–0.7 cm. latis, sepalis interioribus latioribus; petalis 5, luteis, flabelliformibus, 3.5 cm. longis, 2.7 cm. latis; staminibus plurimis; filamentis filiformibus, glabris, 7 mm. longis, liberis basi exceptis; antheris suborbicularibus, ca. 1 mm. longis; ovario ovoideo 3- vel 4-loculari, glabro, multi-ovulato, stylo glabro, 7–8 mm. longo, 3- vel 4-partito, apice ca. 3 mm. diviso, stigmatibus 3 vel 4. Fructus non visus.

VENEZUELA: State of Bolivar: Ptari-tepuí, on densely forested steep south-facing slopes overlying sandstone, between "Cave Rock" and base of high sandstone bluffs, alt. 2285–2400 m., *J. A. Steyermark* 59570 (TYPE, Ch), Oct. 30, 1944 (common shrub 15–25 ft. tall, forming impenetrable thickets with curving matted intertwining stems; leaves deep green or bronze above, dull paler green beneath or suffused with rose or lavender especially on the youngest leaves, the margins purplish red; sepals pale green with rose-red margins or suffused with rose-red; petals rich yellow).—Ptari-tepuí, *Bonnetia roraimae* forest on southwest-facing shoulder, alt. 2000–2200 m., *J. A. Steyermark* 59794 (Ch), Nov. 2, 1944 (common; leaves deep green above, dull green beneath; petals rich yellow).—Auyan-tepuí, alt. 2200 m., *G. H. H. Tate* 1165 (NY), Dec. 1937.

This remarkable species has been recorded from both Ptari-tepuí and Auyan-tepuí, and the field notes of *Tate* 1165 state that it also grows on Mt. Duida.

In the broad thick leaves, stems, and large flowers it resembles *B. crassa* Gleason. However, in *B. crassa* the ovary is always 3-celled, the style entire, the sepals 5 in number, the stigma 3-lobed, and the corolla larger and red or rose in color.

Bonnetia Steyermarkii is different from all other species in the increased number of sepals, the 4-celled ovary, and the 4-parted style. The sepals are double the number usually found in the rest of the genus. Careful dissection shows at least two rows of sepals with little variation, the outer sepals, perhaps, somewhat more narrow than the inner sepals. In all dissections the ovary proved to be 4-celled and the style 4-parted. The division of the style, in future collections, may prove to be even greater. If the flowers are softened by boiling, one can easily separate the styles to the base. This is not the case in other species. One style, in the specimen of *B. Steyermarkii* examined, appeared to be 3-parted. No dissection of this style (and ovary) was made because of the paucity of material. However, in his notes Steyermark refers to "3–4 styles free for 2.5 mm. above."

This is the second species with yellow petals, the other species being

B. tristyla Gleason. The collector refers to this color as rich yellow, so one cannot confuse it with white. In most other species rose or pink appear dominant with white and rose also recorded.

It is with pleasure that I name this distinctive species in honor of Dr. Julian A. Steyermark, who collected three of the new species described in this paper. His excellent material of other species in the genus has aided considerably in this study.

9. *Bonnetia cubensis* (Britton) Howard in Jour. Arnold Arb. 28: 125. 1947.

Kieseria cubensis Britton in Bull. Torrey Bot. Club 41: 19. 1914.

Large tree; branchlets stout, reddish brown, glabrous, terete, often very wrinkled when dry. Leaves coriaceous, glabrous, oblong-obovate, 6–11 cm. long, 2.5–3 cm. wide, obtuse or rounded at the apex, long-tapering at the base, sessile or subsessile, the upper surface of the young leaves covered with a grayish bloom, the margin lightly denticulate toward the apex, the midrib plane above, elevated beneath, the veins conspicuous above, ca. 20 pairs, rising from the midrib at an acute angle, extending parallel toward the margin, presently arcuate-ascending. Flowers solitary, in the axils of the uppermost leaves; peduncles glabrous, stout, ancipital, 3–5 cm. long, with as many as 4 bracts at the apex, the bracts obovate, glabrous, sessile, 11–13 mm. long, 6–7 mm. wide, obtuse or rounded at the apex, sessile, lightly denticulate at the apex, the pedicel stout, subterete, 1–2.5 cm. long; sepals 5, imbricate, persistent, glabrous, unequal, the outer sepals broadly ovate, ca. 1.5 cm. long and 1 cm. wide, the inner sepals subrotund, ca. 2 cm. long and 1.5 cm. wide, the scarious margin more extensive on the inner sepals up to 5 mm. wide, lightly denticulate toward the apex; petals 5, rose, glabrous, broadly flabelliform, 3–3.5 cm. long, ca. 2.5 cm. wide; stamens very many, the filaments glabrous, filiform, unequal, ca. 10 mm. long, joined at the base, otherwise free, the anthers globular, ca. 1.5 mm. long and 1 mm. wide; ovary subconical, glabrous, ca. 5 mm. long, 3-celled, multi-ovulate, tapering at the apex into a glabrous, 3-parted style, ca. 8 mm. long, the stigmas 3. Capsule ca. 1.5 cm. long, 3-celled.

CUBA: Oriente: Moa: Vicinity west of Camp San Benito, alt. 900 m., *J. A. Shafer* 4066 (NY, US), Feb. 24, 1910 (tree 20–40 ft., the largest tree in this region).—Camp La Gloria, across Sierra Moa to Moa Bay, *J. A. Shafer* 8283 (Ch, NY, US), Dec. 31, 1910–Jan. 1, 1911 (tree 20 ft., much branched).—Camp La Gloria, south of Sierra Moa, *J. A. Shafer* 8121 (NY, TYPE; Mo), Dec. 24–30, 1910 (tree up to 40 ft. high; capsules dry).—Punta Gorda River, near the bridge close to the sea, *Marie Victorin, Clément, & Alain* 21436 (G), Apr. 16–23, 1943 (large tree in the semi-deciduous forest).—15 km. southwest of Companie de Moa mills, in dense woods, *R. A. Howard* 5842 (G), July 26, 1941 (tree 15 ft. high; flowers pink).

The presence of this species in Cuba is baffling. It appears to be confined to the small Moa area in Oriente, Cuba, since it has not been recorded from any other area of Cuba or the West Indies. Furthermore, it is the only species of *Bonnetia* found outside of South America.

This species has not been included in any previous treatment of the genus and it was not until 1947 that Howard transferred the species from *Kieseria* to *Bonnetia*.

Up to the present treatment, the flowers of this species had not been described. Dissections made from the flowers of *Howard* 5842 furnished

the data in the above description. There is a very close relationship between this species and *B. stricta* Nees & Martius from Brazil. *Bonnetia cubensis* can be separated from the latter species by the length of the pedicel (1–2.5 cm. long) and petals (3–3.5 cm. long, 2.5 cm. wide) and the lightly denticulate margin on the leaves. In *B. stricta* the pedicel measures ca. 0.5 cm. and the petals 2.5 cm. in length. The margin of the leaves is entire. The greatest difference is the area of distribution of the two species, *B. cubensis* being confined to a small area in Cuba, and *B. stricta* in Brazil.

10. *Bonnetia stricta* (Nees) Nees & Martius in Nov. Acta Phys.-Med. Acad. Leop.-Carol. 12: 37, t. 6. 1824.—G. Don, Gen. Syst. 1: 570. 1831.—Walpers, Repert. Bot. Syst. 1: 373. 1842.—Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 159 (Mém. Ternstr. 71). 1855.—Wawra in Martius, Fl. Bras. 12(1): 324. 1886.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 150. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931.

Kieseria stricta Nees in Wied-Newied, Reise Bras. 2: 338. 1821.

Bonnetia anceps Martius & Zuccarini, Nov. Gen. Sp. 1: 115. 1826.—Cambessedes in St.-Hilaire, Fl. Bras. Merid. 1: 302. 1827.—Sprengel, Syst. Veg. Cur. Post 4(2): 207. 1827.—G. Don, Gen. Syst. 1: 570. 1831.—Spach, Hist. Nat. Veg. 4: 76. 1835.—Walpers, Repert. Bot. Syst. 1: 373. 1842.—Schnitzlein, Iconogr. 3: t. 215. 1852.—Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 159 (Mém. Ternstr. 71). 1855.—Baillon, Hist. Pl. 4: 236. 1873.—Wawra in Martius, Fl. Bras. 12(1): 326, pl. 67, fig. 3. 1886.—Szyszyłowicz in Nat. Pflanzenfam. III. 6: 181. 1893.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 149, fig. 66A. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931.

Bonnetia bahiensis Turczaninow in Bull. Soc. Nat. Moscou 31: 246. 1858.

Bonnetia anceps typica Wawra in Martius, Fl. Bras. 12(1): 326. 1886.

Kielmeyera bracteosa Martius ex Wawra in Martius, Fl. Bras. 12(1): 326. 1886, in synonym.

Bonnetia anceps vars. α and β Wawra in Martius, Fl. Bras. 12(1): 326. 1886.

Kielmeyera Schottii Pohl ex Wawra in Martius, Fl. Bras. 12(1): 326. 1886, in synonym.

Haemocharis stricta (Nees) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Kieseria anceps (Mart. & Zucc.) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Haemocharis anceps (Mart. & Zucc.) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Shrub or small tree 3–5 m. high, the branchlets thick, glabrous, terete, leafless except at or toward the apex, conspicuously dotted by the large leaf-scars, purple-brown, the cortex shriveled in the dried state, obviously succulent in fresh material, often glaucous near the apex. Leaves coriaceous (drying as though succulent in fresh state) oblong-obovate, 7–14 cm. long, 3–5 cm. wide, obtuse to rounded at the apex, long-attenuate or sessile at the base, glabrous on both surfaces, reddish purple and glaucous above, yellow-green beneath with the midrib and occasionally other portions reddish, the margin entire, subrevolute (when dried), the midrib flat or slightly canaliculate above, raised beneath, the veins up to ca. 20 pairs, closely arranged, somewhat parallel, ascending at an abrupt angle toward the margin then arching upward along the margin toward the apex. Inflorescence axillary, the peduncle ancipitous, glabrous, 2–4 cm. long (occasionally up to 6 cm. long), usually one-flowered, occasionally three-flowered, accrescent toward the apex, the pedicels (when present) short, up to 5 mm. long; bracteoles 3, subsepaloid, somewhat rounded, the middle one more elongate, ca. 6–9 mm. long; sepals 5, imbricate, coriaceous,

glabrous, persistent, unequal, the outer two thicker, more nearly rounded, ca. 12 mm. long, the inner three more elongate, thinner, the margins entire, scarious especially on the inner sepals; petals 5, glabrous on both surfaces, rose-colored or white with rose, obcordate, up to 2.5 cm. long, ca. 2 cm. wide at the apex, emarginate, tapering quite abruptly to the base (ca. 0.5 cm. wide); stamens very numerous, about one-half the length of the corolla, the filaments filiform, joined at the base, otherwise free, the anthers oblong, ca. 1 mm. long; ovary conical, ca. 4 mm. long, 2.5–3 mm. thick at base, glabrous, 3-celled, multi-ovulate, tapering into a short style approximating the ovary in length, three-parted at the apex. Fruit (according to other authors) ovoid, 1–1.5 cm. long, 3-celled, many-seeded.

BRAZIL: Rio de Janeiro: In sandy swamps near Rio de Janeiro, *H. Schott* 1605 (G). Bahia: Igreja Velha, *J. S. Blanchet* 3363 (ISOTYPE of *B. bahiensis* Turcz., AA, Ch), 1841; exact locality missing *J. S. Blanchet* 1416 (Ch), 1700 (Ch), 1834. Locality lacking *H. Schott* ?281 (Ch).

For the past 80 years, *Bonnetia stricta* has been encountered only in keys, never in collections. The main reason is because of the misinterpretation of Wawra, in his treatment of the genus in Martius, Fl. Bras. Wawra separated this species from all others in the group by the "membranaceous" leaves. Considering the heavy texture of the leaves I have encountered in species of the genus, I doubt if any species has been found or will be found with this type of foliage.

In 1821, when the species was first mentioned under the new genus *Kieseria* by Nees, a German description signified: a shrub 8–10 ft. high, with long, cuneate, blunt entire-margined juicy-coriaceous leaves and large white flowers which appear in twos, each one provided with three bracts at the base, and stand on short peduncles in the axis of the upper leaves. Nees used the word "saftiglederartigen" to describe the leaves in his German description. The only translation that could be used is "juicy-leathery," a far cry from membranaceous.

Later, in the same year, a latin description appeared, as follows: "... *Kieseria stricta* des Herrn Prof. Nees v. Esenbeck: Classis Linneana Polyandria Polygynia; Fam. Nat. Guttiferarum. Corolla penta petala, petalis integris. Calyx quinque-partitus, bracteatus. Antherae erectae liberae. Germen triloculare, septis simplicibus, loculis monospermis." This description now applied to the species *Kieseria stricta* is the same as the original generic description except for a few transpositions of phrases. It should be noted that in this description the filaments are described as "liberis" or free.

In 1824, three years later, Nees and Martius transferred the species to the new genus *Bonnetia* and presented a much more complete Latin description. Accompanying the description is a plate. In the description the leaves are described as carnose-coriaceous, and the plate carries this out. The filaments, recorded as free in the original description, are not mentioned here. However, the plate distinctly shows them as free.

In 1827, Sprengel, recognizing the close relationship between *B. stricta* and the latter, described *B. anceps* and combined the two under the more recent name. Walpers, in 1842, again recognized both *B. stricta* and *B.*

anceps. His descriptions of the two were identical except that he mentioned the filaments of *B. anceps* as free. Since he did not mention the filaments of *B. stricta* there was no basis for comparison, and according to the illustration of *B. stricta* and a statement in the original description, the filaments are free.

Choisy, in 1855, recognized both species and noted that the peduncles of *B. stricta* were shorter and closer together than those of *B. anceps*. He mentioned that the two species could be separated only with difficulty. In closing he reminded the reader that Sprengel had united the two species and finally suggested that perhaps he (Sprengel) was right!

The first complete treatment of the genus was made by Wawra de Ternsee for Martius' Fl. Bras. in 1886. In this work, *B. stricta* was separated from all other species of the genus by a statement in the key that the leaves were membranous. In his description which followed, the earlier statement was tempered by a reference to the leaves as submembranaceous. Just what Wawra had before him or in mind is difficult to understand. Nees clearly described the leaves as "juicy-coriaceous" in his original German text, and later Nees and Martius, in transferring the species to *Bonnetia*, used the term coriaceous. Perhaps Wawra did not see a specimen of *B. stricta*. Melchior (1925), in his treatment of the Theaceae in the second edition of Nat. Pflanzenfam., followed the work of Wawra and separated *B. stricta* from the other members of the genus on the character of membranous leaves. This same character was used by Gleason (1931), who stated, however, that his key was merely an amplification of Melchior's key to show where his three new species described from Venezuela would fit in Melchior's interpretation.

Wawra, in the diagnostic portion of his description of *B. stricta*, stated clearly that the filaments were free. Later, on the same page, he again referred to the filaments, this time stating that they were joined at the base in fascicles. Both Melchior and Gleason used the latter reference to the filaments, rather than the former, in their respective keys.

Remove the differences in filaments and leaf-texture, and the only variation between the two species so far recorded in literature is the length of the peduncle as cited by Choisy. The illustration of Nees and Martius shows the peduncles to be shorter than those in mature herbarium specimens labeled *B. anceps*, true enough. But the illustration depicts, for the most part, only buds or undeveloped inflorescences. Several specimens cited above, and previously interpreted as *B. anceps* by Wawra, in bud possess short peduncles. Mature flowering specimens exhibit peduncles up to 5 cm. or more. The closeness of the type-localities of the two species along with the fact that *B. stricta* has not been collected, as such, since Martius' treatment, should arouse anyone's suspicions as to whether or not they represent separate entities.

11. *Bonnetia paniculata* Spruce ex Benth. in Jour. Linn. Soc. 5: 63. 1861.—Wawra in Martius, Fl. Bras. 12(1): 325. 1886.—Oliver in Trans. Linn. Soc. ser. 2, 2: 271. 1887.—Szyszyłowicz in Nat. Pflanzenfam. III. 6: 181. 1895.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 149, fig. 66 B-D. 1925.—Gleason in Bull. Torrey Bot. Club. 58: 397. 1931.

Bonnetia parviflora Spruce ex Benth in Jour. Linn. Soc. 5: 63. 1861.

Bonnetia paniculata typica Wawra in Martius, Fl. Bras. 12(1): 325. 1886.

Bonnetia paniculata Spruce ex Benth. var. *parviflora* (Spruce ex Benth.) Wawra in Martius, Fl. Bras. 12(1): 325, pl. 67. 1866.

Kiesera paniculata (Spruce ex Benth.) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Small tree 5–10 m. high with rough bark. Branchlets terete (striate in the dried state), glabrous, reddish purple, the leaf-scars as much as 3 cm. apart. Leaves coriaceous, glabrous, oblique, oblong-obovate, 8–12 cm. long, (2.5–)3–5 cm. wide, usually rounded or obtuse at the apex, acute in the narrower leaves, long-attenuate at the base, deep green above, dull rich green beneath, the margin entire, the veins many, close, conspicuous on both surfaces, rising sharply from the midrib and ascending parallel to the margin, the petiole 5 mm. long. Inflorescence laxly paniculate, each peduncle in the axil of a miniature leaf which is quickly caducous giving the appearance of a leafless panicle; peduncles glabrous, brownish red, compressed, branched or unbranched, usually three-flowered, the lower peduncles longest, up to 5 cm. long, gradually decreasing in length toward the apex, appearing pyramidal; pedicels 5–10 mm. long, angled, usually in threes, the bracteoles quickly caducous, the scars or vestiges evident; sepals 5, coriaceous, dull green tinged with red, somewhat rounded-elliptic, ca. 1 cm. long, 6–7 mm. wide, the margin entire, subscarious, the inner sepals larger; petals 5, emarginate, up to 2 cm. long, ca. 1.5 cm. wide at the apex tapering abruptly to base, white or white tinged with pink or rose; stamens many, the filaments thread-like, joined at the base, otherwise free, glabrous, 8–10 mm. long, the anthers minute, ca. 1 mm. long; ovary conical, glabrous, ca. 3–4 mm. diam. tapering at the apex into a style which is 3-parted at the apex, ca. 8–9 mm. long, sometimes shorter. Capsule (including style) ca. 2 cm. long.

PERU: Dept. San Martín: Near Tarapoto, *R. Spruce* 4809 (ISOTYPES Ch, G, NY), 1855–56.—Near Tarapoto, *R. Spruce* 4239 (ISOTYPES of *B. parviflora*, Ch, G, NY), 1855–56.—Tarapoto, alt. 750 m., *L. Williams* 5955 (Ch, US), 5974 (Ch, US), Dec. 1929.—San Roque, alt. 1350–1500 m., *L. Williams* 7674 (AA, Ch, US), Feb. 4, 1930.—Zepelacio, near Moyobamba, mountain forest, alt. 1200–1600 m., *G. Klug* 3450 (AA, Ch, G, Mo, NY, US), Dec. 1933 (tree 5 m. high with bright rose flowers).

VENEZUELA: Terr. Amazonas: Aguita, slopes of Mt. Duida, alt. 1300 m., *G. H. H. Tate* 928 (NY), Aug. 1928–Apr. 1929 (flowers large red-pink). Bolívar: Gran Sabana, between Mission of Santa Teresita de Kavanayén northwest to Río Karuai, on border of steep woods bordering savanna, alt. 1220 m., *J. A. Steyermark* 59379 (Ch), Oct. 26, 1944 (tree 10 m. tall; leaves coriaceous, deep green above, dull rich green beneath; sepals dull green tinged with brownish brick, as are the peduncles and pedicels; petals white or white tinged with pink).—Wooded slopes of Québrada O-paru-má, between Santa Teresita de Kavanayén and Río Pacairao (tributary of Río Mouak), upper drier part of forest below mesa, alt. 1065–1220 m., *J. A. Steyermark* 60356 (Ch), Nov. 20–21, 1944 (small tree 10 m. tall with coriaceous leaves deep green above, dull green beneath).

BRAZIL: Amazonas: "Rio Curicuriary (affl. Rio Negro) ad ripas cataractae Cajú, 'catinga,'" *A. Ducke* 345 (AA, Ch, Mo, NY, US), Nov. 18, 1936 (small tree with white flowers).—"Rio Curicuriary affl. Rio Negro super, ad ripam saxosam cataractae Cajú," *A. Ducke* 23741 (US), Oct. 20, 1932 (small tree with white flowers).

BRITISH GUIANA: Region of Mt. Roraima, "Our House," alt. 1900 m., *E. F. imThurn* 135 (US), Dec. 9, 1884.

As the specific name indicates, this species is chiefly characterized by

the paniculate inflorescence. The panicles are large and spreading, pyramidal in shape with the lower peduncles longest and those above increasingly shorter. This inflorescence has often been described as a leafless panicle. Although it usually appears leafless, each peduncle arises from the axil of a leaf which is quickly caducous even in the early flowering stage. The flowering leaves, like the peduncles, decrease in size as they near the apex of the inflorescence. Occasional leaves may be seen in the inflorescence. If not present, a leaf-scar remains to show its erstwhile presence.

The oblique leaves present another consistent character. One-half of the leaf forms a nearly perfect arc. The difference in size and shape appears to depend upon the amount of variation in the outline of the opposite half of the leaf. When the "bulge" is greatest, the apex appears subrotund or obtuse; in the leaves with the least variation the apex may appear nearly acuminate.

The leaves are not crowded at the apex as in some of the other species. Like *B. sessilis* the distance between the internodes is greater and the leaves extend farther down the branchlet.

A very close relative is *B. holostyla* Huber. The only real variation in *B. holostyla*, as the name indicates, is the entire style. The leaves in the latter species are oblique but not as prominently so.

The style in *B. paniculata* is strongly 3-parted at the apex. However, I have studied flowers in which the style was not 3-parted at the stage examined, but possessing three lines at the apex showing that eventually the style would probably separate into three parts.

In describing *B. paniculata*, Spruce at the same time described *B. parviflora* from the same region in Peru. The flowers and leaves of Spruce 4239 are smaller than those found in most specimens. However, there is such great variation in both parts as to make the specific status of *B. parviflora* untenable. I do not feel that it can be retained even as a variety as proposed by Wawra in Martius' *Flora Brasiliensis*.

This is the most widely distributed species as far as present collections are concerned, extending from Peru through Brazilian Amazonas and Venezuela into British Guiana.

12. *Bonnetia Dinizii* Huber in Bol. Mus. Goeldi 7: 302. 1913, in adnot.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 150. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931.

Small graceful tree (fide Ducke). Branchlets roughened by close arrangement of leaf-scars, glabrous, somewhat reddish. Leaves coriaceous, glabrous, somewhat concentrated at the apex of the branchlets, more distant on flowering branchlets, oblong-spathulate, 6–10 cm. long, 2–2.5 cm. wide, obtuse or rounded at the lightly retuse apex, long-attenuate at the base, subsessile (the petiole 2–3 mm. long), the margin finely denticulate, the veins many pairs, slightly elevated on both surfaces, rising from the midrib at an acute angle, extending parallel toward the margin and then sweeping upward. Inflorescence axillary, single- or three-flowered, the peduncles glabrous, up to 3 mm. long; pedicels very short, ca. 3 mm. long;

bracteoles 3 to a flower, quickly caducous, 9 in a verticillate arrangement at the base of the pedicels when three-flowered, at different intervals along the peduncle when one-flowered, glabrous, foliaceous in shape and texture, spatulate, 10–12 mm. long, ca. 4 mm. wide, the margin most minutely denticulate; sepals coriaceous, imbricate, glabrous, unequal, the outer two ovate, 10×6 mm., the inner three more rotund, the margin entire, scarious, more so on the inner sepals; petals 5, rose-colored, variously obcordate, 2–2.2 cm. long, ca. 2 cm. wide, retuse or emarginate at the apex, tapering toward a narrow base; ovary conical, glabrous, ca. 3 mm. across, tapering at the apex into a stout glabrous style 10 mm. long, strongly 3-parted for 3 or more mm. at the apex, a line of demarcation extending from the point of division down the length of the style to the base of the ovary. Capsule ca. 1 cm. long.

BRAZIL: Pará: "Hab. in campis ad fl. Ariramba Guianae brasiliensis," A. Ducke 8094 (photo of type, Ch, G), Nov. 23, 1906 (small graceful tree with rose-colored flowers).—"Campos de l'Ariramba (Trombetas)," A. Ducke 11298 (US; photo Ch), Dec. 2, 1910.

It may be that *B. Dinizii* is very localized. Very little material was available for this study, only two specimens, both collected by Ducke in the same locality. A photograph of the type shows that the original collection was very sparse and Huber's description was equally scanty. The above description of the flower was drawn from Ducke 11298, the second collection, and this was made from a single dissection.

Interesting characters worthy of notation are: (1) the stout style, strongly 3-parted at the apex, with a line or depression extending the entire length of the style and the ovary, showing clearly the eventual line of dehiscence; (2) the spatulate leaves, finely denticulate along the margin; and (3) the foliaceous bracteoles, three to a flower, arranged in a whorl in the 3-flowered inflorescences, or along the peduncle in the single-flowered inflorescences.

Bonnetia paniculata is the closest relative. It can be separated from the above species by the entire, oblique leaves, and the large, open, paniculate inflorescence.

13. *Bonnetia sessilis* Benth. in Hooker, Lond. Jour. Bot. 2: 363. 1843.—Walpers, Repert. Bot. Syst. 2: 801. 1843.—Schomburgk, Versuch Fauna Fl. Brit.-Guiana 1093. 1848.—Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 160 (Mém. Ternstr. 72). 1855.—Wawra in Martius, Fl. Bras. 12(1): 327, pl. 67, fig. 1. 1886.—Oliver in Trans. Linn. Soc. ser. 2, 2: 271. 1887.—Szyszylowicz in Nat. Pflanzenfam. III. 6: 181. 1893.—Melchior in Nat. Pflanzenfam. ed. 2, 21: 150. 1925.—Gleason in Bull. Torrey Bot. Club 58: 397. 1931.

Kiesera sessilis (Benth.) O. Kuntze, Rev. Gen. Pl. 1: 62. 1891.

Bonnetia Phelpsii Gleason in Brittonia 3: 170. 1939.

Shrub or small tree up to 4 m. high. Branchlets glabrous, stout, brown-purple when very young, becoming gray, striate (probably in drying), the leaf-scars rather inconspicuous and as much as 1 cm. distant. Leaves coriaceous, glabrous, extending along the branch, elliptic to oblong-ob lanceolate, varying in size, usually up to 6 cm. long and 3 cm. wide, occasionally up to 10 cm. long and 4 cm. wide, deep green above, dull green beneath, obtuse and emarginate at the apex, broadly cuneate at the

base, sessile, the margin entire, the veins elevated on the upper surface, subparallel and close, curved ascending, anastomosing near the margin into a conspicuous connecting vein, with a single additional marginal unbranched vein extending from the base to near the apex between the anastomosed margin vein and the margin. Flowers solitary in the axils of the upper leaves, the pedicel stout, reddish purple, glabrous, ca. 1 cm. long; bracteoles apparently 3, foliaceous, oblong-obovate, ca. 12 mm. long and 6 mm. wide, glabrous, rounded at the apex; sepals 5, imbricate, glabrous, coriaceous, the two outer smaller, 11–12 mm. long, nearly as wide, the inner three larger, up to 17 mm. long and 12 mm. wide; petals 5, white with rose or pink tips, triangular-obovate, conspicuously retuse, 3–3.5 cm. long, nearly as wide at the apex, tapering abruptly from the middle to the base; stamens very numerous, the filaments filiform, 8–11 mm. long, free except at the base, the anthers oblong, ca. 1.5–2.0 mm. long; ovary conical, 3-celled, about 3 mm. diameter, glabrous, tapering gradually at the apex into a stout style, a centimeter or more long, 3-parted at the apex, the stigmas 3.

BRITISH GUIANA: Between Ireng and Cotinga rivers, Roraima region, on high stony ground, alt. 900 m., *E. F. imThurn* 11 (US), Oct. 1884–Jan. 1885.—Roraima, *R. Schomburgk* 636 (Ch), 1842–43.—Kaieteur Savanna, (occasional tree 4 m. high, 6 cm. diam., flowers white) *B. Maguire & D. B. Fanshawe* 23258 (A, NY), May 6, 1944.

VENEZUELA: State of Bolivar: Gran Sabana, between mission of Santa Teresita de Kavanayén northwest to Río Karuai, dry sandy and rocky open thickets on large mesa, alt. 1220 m., *J. A. Steyermark* 59340 (Ch), Oct. 26, 1944 (common shrub 1–2 m. tall with coriaceous leaves, deep green above, dull green beneath, the inner sepals yellow-green with dull rose margins, the outer sepals dull green with rose-purple margins, the petals white with pink or pale rose around the tip).—Vicinity of "Misia Kathy Camp," on mesa between Ptari-tepuí and Sororopán-tepuí, alt. 1615 m., *J. A. Steyermark* 60232 (Ch), Nov. 15–17, 1944 (common and dominant, the petals white with pink at tip).—Rocky savanna bordering Río Karuai, between La Laja and Santa Teresita de Kavanayén, alt. 1220 m., *J. A. Steyermark* 60821 (Ch), Nov. 30, 1944 (dominant shrub 1–2 m. tall with white petals with pink or rose tip).—Mt. Auyan-tepuí, rocky savanna on burned mountain, alt. 1500 m., *F. Cardona* 65 (US), May 21, 1937.—Mt. Auyan-tepuí, Guayana, rocky and humid savanna, alt. 1000–1200 m., *F. Cardona* 218 (US), Sept. 1937.—Mt. Auyan-tepuí, alt. 1100 m., *G. H. H. Tate* 1158 (NY, TYPE of *B. Phelpsii*), Dec. 7, 1937.—Mt. Auyan-tepuí, alt. 1850 m., *G. H. H. Tate* 1162 (NY), Jan. 1938.—Cerro Guaiquinima, Alto Rio Paragua, Guayana, alt. 1760 m., *F. Cardona* 1118 (US), July 15, 1944 (shrub 3 m. high).

The venation of the leaves in this species constitutes one of the outstanding characters of distinction and is quite consistent. Along the margin, more evident on the upper surface, are what appear to be two pairs of submarginal veins. The exterior pair of veins is the lighter of the two pairs and originates near the base of the leaf, extending upward and continuing without branching for the whole length of the leaf, occasionally fading out somewhat, near the apex. The inner pair is formed by the anastomosing of all the remaining major veins in the leaf near the margin and extending upward toward the apex. Gleason in describing *B. Phelpsii* drew attention to this excellent character. The leaves of the type of *B. Phelpsii* are larger than those found on the earlier known speci-

mens of *B. sessilis*, but with the addition of the excellent material of Steyermark this character ceases to be of importance, since both large and smaller leaves are found on the same specimen.

Most workers have considered the style in *B. sessilis* as entire. Wawra seems to have been the first to mention the style and he called it entire. Melchior and Gleason both used the entire style as a feature of distinction in their keys. In all the material studied above, none was found in which the style was entire. If such were the case, one would expect a three-lobed stigma rather than three distinct stigmas, as the case happens to be. The style is split only briefly at the apex but must be termed 3-parted rather than entire.

I have included the bracts in my description above. I presume these are quickly caducous, since they are seldom found even on flowering specimens.

14. *Bonnetia duidae* Kobuski & Steyermark, sp. nov.

Frutex 1–2 m. altus; ramulis crassis, juventute hirsutis, apice dense cicatricosis. Folia coriacea, ad apicem ramulorum conferta, lanceolata, sessilia, juventute supra hirsuta, 4.5–5.5 cm. longa, 1–1.4 cm. lata, apice acuta, basi rotundata, margine integra, costa basi expansa, supra plana basi hirsuta, subtus elevata, glabra, venis lateralibus numerosis, proximis (ca. 20 per cm.), parallelibus, sub angula acutissimo adscendentibus, supra ut videtur aciculatis, subtus prominulis. Flores apice ramulorum solitarii; pedicellis hirsutis, 1.3 cm. longis; sepalis 5, imbricatis, lanceolatis, ca. 3 cm. longis, 1 cm. latis, duobus exterioribus omnino dorsali hirsutis, tribus interioribus in parte medio dorsali hirsutis margine latiori scariosis; petalis 5, roseis, obovatis, papyraceis, 4–5 cm. longis, 1.5 cm. latis; staminibus numerosis; filamentis 8–10 mm. longis, liberis basi exceptis; antheris 1.5 mm. longis; ovario ovoideo, glabro, 3-loculari, multi-ovulato, stylo 1.4 cm. longo, apice 3-partito. Fructus non visus.

VENEZUELA: Territorio Federal Amazonas: Summit of Cerro Duida, Brocchinia Hills, dry ridge top, alt. 1700–1980 m., *J. A. Steyermark* 58186 (TYPE, Ch), Sept. 1, 1944 (shrub 4–5 ft. tall; leaves in terminal rosette, coriaceous, deep rich olive green above, yellow or golden green beneath, petals deep rose).

The cortex of the terminal branchlets of this species is roughened by the elliptic leaf-scars which appear in such close proximity as to simulate the rough branches of some of the species of *Abies*. At the tips of the very young branchlets, between the densely occurring leaf-scars, can be found a hirsute pubescence which vanishes shortly after the leaves fall.

Only a very few leaves are to be found on the specimen. Steyermark in his field notes mentions the leaves as being “in a terminal rosette” — and so they appear. The lanceolate shape is unusual for the genus. The extremely close parallel veins ascend at a very acute angle and they are of such great number and are so close that one is reminded of the veining in *Calophyllum*. The midrib fans out noticeably at the base causing the leaf-scar to become wider than long. The upper surface of the very young or unfolding leaves is completely covered with a hirsute pubescence. The under surface is glabrous. As the leaf matures the pubescence disappears except for a tuft of hair at the base of the midrib on the upper

surface. Leaves can be found with hirsute midribs and ciliate margins in varying degrees of pubescence.

The pedicels and calyx-lobes are also hirsute. This pubescence on the long-lanceolate calyx-lobes constitutes a very important means of distinction. The two outer lobes are pubescent over the entire exterior surface. On the inner lobes, the pubescence is confined mostly to the portion exposed in the imbricate arrangement, the innermost lobe being completely glabrous. The margins of the lobes are scarious. As the intensity of the pubescence decreases, the width of the scarious margin of the inner lobes increases.

In most species, the width of the petals at the apex is about equal to their length. In this species, the width of the petal is only half that of the length.

The closest relative is *B. lanceifolia* Kobuski which differs from the present species in (1) the absence of pubescence on the leaves and branchlets, (2) the shorter and glabrous peduncles and sepals, (3) the shorter petals (2 cm.) as wide as long, and (4) the very few (5–7) pairs of veins inconspicuous on both surfaces of the leaves.

15. *Bonnetia lanceifolia* Kobuski, sp. nov.

Habitus ignotus (probabiliter frutex). Ramuli teretes, glabri, griseo-brunnei, foliis paucis apice confertis. Folia coriacea, glabra, lineari-lanceolata vel lanceolata, 4.5–6.5 cm. longa et 0.7–1.3 cm. lata, apice acutissima basi cuneata, sessilia, margine integra, venis 5–7 paribus, arcuato-adscendentibus, undique inconspicuis. Flores apice ramulorum solitarii, axillares; pedunculis glabris, teretibus, 4 mm. longis; sepalis 5, imbricatis, glabris, inaequalibus, duobus exterioribus ovato-lanceolatis, 10–11 mm. longis, ca. 6 mm. latis, apice acutis vel subacutis, tribus interioribus late ovatis, 12–14 mm. longis et 8 mm. latis, apice obtusis vel subrotundatis, margine scariosis; petalis 5, convolutis, flabelliformibus, 2 cm. longis, apice 1.5–2 cm. latis; staminibus numerosis; filamentis filiformibus glabris, ca. 6 mm. longis, liberis basi exceptis; antheris oblongis, ca. 1.5 mm. longis; ovario glabro, conico, ca. 4 mm. longo, 3-loculari, multiovulato, apice in stylum attenuato; stylo glabro, 5 mm. longo, apice ad 1.5 mm. 3-partito, stigmatibus 3. Fructus non visus.

VENEZUELA: Bolívar: Cerro Guaiquinima, Alto Río Paragua, alt. 1740 m., *F. Cardona* 942 (TYPE, US), Oct. 1943.—Same locality, alt. 1600–1800 m., *F. Cardona* 1126 (US), July 15, 1944.

This species in leaf-shape and leaf-size resembles *B. duidae* Kobuski & Steyermark. However, in *B. duidae* the upper surface is hirsute and the many veins, distinguishable on both surfaces, are so close together that counting becomes difficult.

Further differences between the two species can be found in the flower. In the present species, the peduncles are glabrous and measure but 4 mm. long, the sepals are glabrous, and not longer than 1.4 cm., the corolla (2 cm. long) is as broad at the apex as long, the anthers 1.5 mm. long, and the style 3-parted for only 1.5 mm. at the apex. In *B. duidae*, the peduncles are hirsute, measuring 13 mm. long, the sepals also are hirsute,

lanceolate, and 3 cm. long, the corolla (3 cm. long) is only one-third as wide as long, the anthers 6 mm. long, and the 3 styles separate to the base.

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ADDITIONAL NOTES ON THE CONVULVULACEAE OF NEW GUINEA

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With one plate and one text-figure

IN A PAPER prepared for *Nova Guinea*, n. s. 5: 15–34,¹ the author gave an enumeration, with keys to the genera and species, of the Convolvulaceae known from New Guinea and adjacent islands. When that paper was already in press, a collection of Convolvulaceae made by Mrs. Mary Strong Clemens in the Morobe District, Northeast New Guinea, reached him, through the Arnold Arboretum. Moreover, a few specimens from other collections, mainly those of Mr. L. J. Brass, gathered during the Archbold Expeditions, were put at his disposal. A list of them with some notes and the description of a new species of *Erycibe* follow here.

The specimens are in the herbarium of the Arnold Arboretum (A); some duplicates are in the Rijksherbarium at Leiden (L).

Evolvulus L.

Evolvulus alsinoides L. var. *decumbens* (R. Br.) Van Ooststr. in Meded. Bot. Mus. en Herb. Utrecht 14: 38. 1934; id. in *Nova Guinea*, n. s. 5: 17.

† NORTHEAST NEW GUINEA: Morobe District, Wantoat (Wantot), alt. 3500–6000 ft., flowers blue, *M. S. Clemens* 11028, Jan. 23, 1940 (A); id., Boana, alt. 2500–4500 ft., flowers pale blue, *M. S. Clemens* 41628, May–Nov., 1940 (A).

DISTRIBUTION: Australia, New Guinea, New Caledonia, Fiji Islands, Netherlands Indies, Philippines, Indo-China, China.

This is the only variety of the variable *E. alsinoides* L. occurring in New Guinea.

Erycibe Roxb.

Erycibe Hellwigii Prain in Jour. Asiat. Soc. Beng. 63: 84. 1894, note; Van Ooststr. in *Nova Guinea*, n. s. 5: 18.

NORTHEAST NEW GUINEA: Morobe District, Malalo Mission (Salamaua), margin of hill woods, alt. 800–900 ft., on small trees; fruit of brick colour, *J. & M. S. Clemens* 3183, May 25, 1936 (A); id., vicinity of Kajabit Mission, alt. 800–2000 ft., *M. S. Clemens* 10791, Aug.–Dec. 1939, a fruiting specimen (A); id., vicinity of Kajabit Mission, gully woods, steep above rivulet, alt. 1300 ft., tall vine; fruit bronze yellowish, *M. S. Clemens* 40858, Dec. 29, 1939 (A).

DISTRIBUTION: Endemic in New Guinea.

Erycibe Clemensae sp. nov. PLATE I; fig. 1, *a*, *b*.

Frutex (scandens?), ramulis junioribus subteretibus, mox rimis longitudinalibus nonnullis subangulatis, c. 2–3 mm. crassis, dense ferrugineo-tomentosis pilis stellatis 3–4(–6)-brachiatis, ramulis adultioribus glab-

¹ Not yet published.

rescentibus. Folia petiolata, petiolis (5-)7-8 mm. longis, tomentosis ut ramuli; laminis satis parvis coriaceis, ellipticis vel oblongo-ellipticis interdum obovatis interdum oblongis, apice obtusis et breviter acuminatis, basi acutis vel subobtusis, margine integerrimis, supra nitidis, subtus opacis, 5-7.5 cm. longis, (1.5-)2-3.5 cm. latis, glaberrimis nervo mediano utrinque excepto; nervo mediano nervis lateralibus utrinque 5 vel 6 supra impressis subtus prominentibus, nervis minoribus supra haud vel vix conspicuis, subtus indistinctis. Inflorescentiae tomentosae ut ramuli, axillares vel terminales, racemosae vel angustissime paniculatae, foliis breviores vel paullo longiores, (2.5-)4-10 cm. longae; flores breviter pedicellati, pedicellis 2-3 mm. longis tomentosis; bracteis lineato-oblongis, 1.5-4.5 mm. longis, concavis, externe tomentosis, interne glabris. Sepala concava

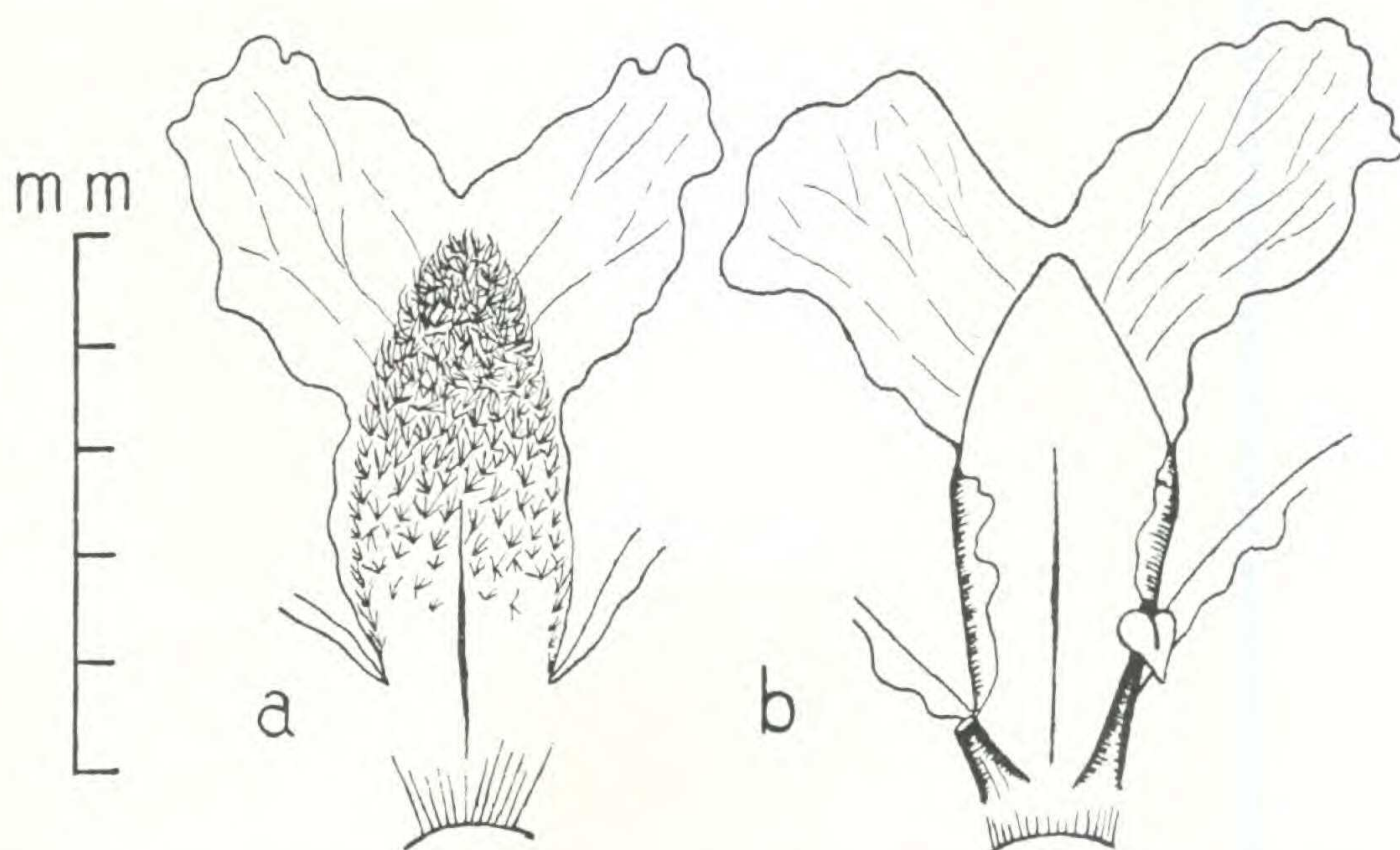


FIG. 1. *Erycibe Clemensae* sp. nov.: corolla-lobes, *a* from without, *b* from within.

orbicularia vel transverso-elliptica, apice late rotundata, 2.5-3 mm. longa, externe tomentosa interne glabra, interiora marginibus lateralibus tenuioribus. Corolla 5-partita, c. 7.5 mm. longa, basi glabra, fasciis 5 mesopetalis carnis oblongis externe dense tomentosis; lobulis oblongis vel rectangularibus apice truncatis vel irregulariter grosse crenatis, supra fasciam mesopetalam breviter connatis, basi in fasciam mesopetalam decurrentibus, 3-3.5 mm. longis. Stamina prope basin corollae inserta; longitudo filamenti sesquiplez antherae; antherae incurvatae, cordiformes, acutae. Ovarium oblongum vel obovoideum, parte inferiore glabra, parte superiore tomentosa, stigmate apice radiatim 5-carinato.

NORTHEAST NEW GUINEA: Morobe District, Wareo, alt. 2000 ft., *Clemens* 1622, Jan. 13, 1936, TYPE in herb. Leiden, sub no. 937,351-618; another specimen in the herbarium of the Arnold Arboretum; id. Wareo, alt. 2000 ft., in hill forest, prob. a shrub, not high; flowers cream-yellowish, *J. & M. S. Clemens* 1502, Jan. 4, 1936 (L).

The Latin description has been based on the type; in *Clemens* 1502 the leaves are ovate to oblong-lanceolate and larger than those of the type, up to 10 cm. long and 4.5 cm. wide.